

ANALYSIS OF MATHEMATICS TEACHING BASED ON THE STUDENTS CHARACTERISTICS

Rina Oktaviyanthi

Universitas Serang Raya (Unsera), Indonesia, rinaokta1210@yahoo.com

Abstract

This study focused on the design of teaching that include learning context of learners, characteristics of learners, and learning tasks given to learners. Thirdly it has an important role in the design of teaching that will be done by teacher in the classroom. Learning context related to alternative teaching model that will be used which has been adapted to the curriculum and the subject of the subject matter so that the learning objectives to be achieved can be in harmony. Characteristics of learners are traced in this study include personality tendencies, hemispheric dominance, and learning styles. The last is the planning aspect of learning tasks for learners. This section has a position as one measure of the success of teaching at the same important information that will be used as a teaching evaluation. Teachers are required to design learning tasks that will accommodate all aspects evaluated, such as student achievement related to the objectives of the curriculum and subject matter, the achievement of students with respect to alternative models used, the achievement of students with the characteristics of the development itself. Learning model used is the STAD cooperative learning. In this study presented the results of the design of teaching relating to learning context of learners, characteristics of learners, and the learning task that has been done in SMAN 1 Manyar, Gresik, includes the step of observation, planning, implementation and evaluation.

Key words: cooperative learning, hemispheric dominance, learning styles, mathematics teaching, personality tendencies

1. INTRODUCTION

Being a teacher which is concerned about education requires the totality of creativity, taste, and intention to develop their competence optimally in personal competence, professional, and community. The competence is absolute developed to build and strengthen the role of the teacher to anticipate the challenges of education in the future.

This is related to the position of teachers in Indonesia, which is considered very important, comparable to the interests of its role in the effort to educate the children as the holder of the future. In line with that expressed by Samani (2010), that the teacher is the most important factor in education. The teacher will be implemented and used curricula and educational facilities in school. Because of this interest, then in 2005, the government passed Law No. 14 on Teachers and Lecturers (UUGD). Essentially becoming a professional educator means requires teachers always try to get the continuity of education wheels keep spinning stable so what is the purpose of education can be realized.

As a teacher, understanding the developmental characteristics of learners is the important things that need to be noticed. The development of such learners include: physical development, social-emotional development, and leads to intellectual development. Physical development and social development have a strong contribution to the development of intellectual or mental development or cognitive development of students. An understanding of

the development of the students is necessary for designing an encouraging learning that will be implemented. The design of an encouraging learning will increase student motivation so that can improve the process of learning and the students' achievement.

The latter is the planning aspect of learning tasks for learners. This section has a position as one measure of the success of teaching at the same as the important information that will be used as a teaching evaluation. Teachers are required to design the learning tasks that will accommodate all aspects evaluated, such as student achievement related to the objectives of the curriculum and subject matter, the achievement of students with respect to alternative models used, the achievement of students with the characteristics of the development itself.

With observe to the third thing that is needed in the design of the teaching, the author tries to describe in this paper based on the activities that have been carried out in SMAN 1 Manyar, Gresik, includes the observation phase, the planning phase of teaching, the implementation phase and the evaluation phase.

The goals of this paper are (1) as a deepening of character educators who search for teaching professionalism, (2) as a chance of learning to understand the important role of a teacher in the realization of educational goals to be achieved, and (3) as one task subjects Planning and Evaluation of Teaching.

Some of the perceived benefits of the author as the leader in the design of this teaching are (1) author have a responsibility to learn more before teaching in the classroom, (2) author learn to get used being professional in teaching and strive to accomplish the professionalism both before and after the teaching, and (3) author learn to attach sharpness in terms of the context of the analysis of student learning, student characteristics, and student learning tasks.

2. RESEARCH METHOD

This research used STAD cooperative learning and divided into three analyses.

A. Analysis Instructional

As described in the previous chapter, that one attempts to train professionalism of educators is to optimally design the classroom teaching that includes three things, namely the analysis of the context, the analysis of the students, and the analysis of the learning task.

1) Analysis Context

The purpose of this phase is to identify the learning purpose according to the applicable curriculum with the fact that occur in the field concerning models, approaches, methods, technical and teacher strategies used to achieve the learning objectives. Study materials, subject matter or materials to be developed are the aspects that will be arranged an alternative or a way of learning that is appropriate in order to achieve the goal as expected in the curriculum.

2) Analysis Students

The analysis of student is done to know the early behavior and characteristics of students that include traits, abilities, and experience of both individuals and groups.

(a) Initial Student Behavior

Beginning of the student's behavior needs to be identified to know specific skills possessed by the student prior to implementing the learning process. This does not mean it will make a list of what has been done by the students, but the need to identify the specific

skills that students should be able to do to start learning to run efficiently and effectively as well as efficiently (Kardi, 2003).

(b) Characteristics of Students

Analysis of students' characteristics is very important to do at the beginning of the planning. This analysis is done by taking into description the characteristics, abilities, and experiences of students both as individuals and as a group. Analysis of student characteristics include, among others: academic ability, age and level of maturity, motivation towards the subject, experience, psychomotor skills, ability to cooperate, social skills, and so on (Ibrahim, 2000). The results of this analysis can be used to prepare a description of the learning device.

Characteristics of students that are noticed in this study include the average result of learning Math, personality type, the use of hemispheres preference (of the brain), learning styles, and thinking styles.

(1) Personality type

Personality shows the total quality of the individuals' behavior that appears to adapt itself to its unique environment. The uniqueness here is that such behavior is single qualities that distinguish individuals from one another.

Personality type that is used to confine the data of students' characteristics is classified by Hippocrates-Galenus. Hippocrates classifies a person's personality is influenced by processes in the body, especially by the working fluids in the body, which includes: the type Sanguine (blood), type Choleric (yellow bile), type Phlegmatic (mucus), and the kind of Melancholic (black bile). Galenus enhance the knowledge of Hippocrates, and distinguish on the basis of the circumstances of individual personality proportion of the liquid mixture. If the fluid in the body exceeds the proportion that should be (dominant), it will result in the presence of psychological traits typical. In more depth later the experts develop instruments and indicators to detect the character and temperament of individuals with regard to the pattern of personality-Galenus Hippocrates.

(2) Hemisphere Preference

The human brain is divided into two main sections-the left brain and the right brain. Each has different functions and roles, although sometimes both affect each other. According to Ball (2001), the functions of the two parts are: The left hemisphere is known as the area of language. That part is also believed to be the controller of cognitive functions in general. Some researchers during this assume that conscious related to/ derived from the left hemisphere. The right hemisphere plays an important role in processes such nonverbal complex relationships and detection sound on hearing. The right hemisphere is also believed to relate to the emotional stimulus.

(3) Learning Style

Learning styles is observed as a combination of how a person absorbs, and then organizes and process information. If a student is familiar with their individual learning styles, then he can take important steps to help him learn faster and more easily. And also, to learn how to understand how to learn other people, such as peer

learning, can help strengthen relationships with one another. Three categories of learning style someone who has been known to extend the category of VAK (Visual, Audio, and Kinesthetic) learning styles.

(4) Thinking Style

VAK identification system distinguishes how people absorb information. To determine brain dominance and how people process information, use the model originally developed by Anthony Gregorc, a professor of curriculum and instruction at the University of Connecticut. Investigative study concluded that there are two possibilities brain dominance:

- Perception of concrete and abstract, and
- Ability sequential arrangement (linear) and random (nonlinear)

It can be combined into four combinations of behavioral group called thinking styles. Gregorc (Porter, 2001) refer to these forces, concrete sequential, abstract sequential, concrete random, and abstract random.

3) Analysis Learning Task

According to Kemp (1994), learning task analysis is a compilation of procedures for determining the contents of teaching. Meanwhile, according to Nur (2002), learning task analysis is a tool used by teachers to identify with high precession of the exact nature of procedural knowledge and declarative knowledge and taught.

Further learning task analysis in line with the analysis of the components of the learning objectives that describe a system that analyzes conducted to know the learning objectives and determine the learning models to achieve the goal. Therefore the purpose of analysis to identify the subordinate skills (prerequisites) students needs to learn the steps and procedures that should be followed by a subordinate student to learn the process. This analysis will produce a diagram or chart that contains the skills and relationships between these skills (Kardi, 2003).

So the learning task analysis, concept, information processing are used to facilitate the understanding or mastery of learning tasks and learning objectives as outlined in the form of Lesson Plan and the Student Activity Sheet.

B. Learning Model

According to Ismail (2003), the term learning model has a broader meaning than the strategies, methods, or procedures. A learning model has four special features that are not owned by a particular strategy or method, namely logical rational theoretical compiled by its creator, learning objectives to be achieved, the behavior that is required in order to teach the model can be implemented, as well as the learning environment necessary for the purpose learning can be achieved.

According to Ibrahim (2000) cooperative learning is an instructional approach that promotes students cooperation in groups to achieve learning objectives. Meanwhile, according to Wina (2006), the model is a series of group lessons and learning activities undertaken by students in certain groups to achieve the objectives that have been formulated. The purpose of cooperative learning is the result of increased student academic learning and students can receive a wide diversity of friends and develop social skills.

STAD (Student Teams Achievement Divisions) is one type of cooperative learning that have been implemented in class XI-IPA 3, SMAN 1 Manyar, Gresik. STAD cooperative learning is the simplest cooperative learning but capable of becoming one of the alternatives learning to provide an understanding of the learning concept materials to students. Implementation's phases of STAD cooperative learning are as follows:

1. Teachers deliver learning materials to the students appropriate the basic competencies to be achieved. Teachers can use variety learning in delivering the learning materials to the students. For example, teacher guided discovery method or speech method. This step should not be done in one meeting, but it can be more than one.
2. Teacher formed groups. Each group consists of 4-5 members, where the members of the group have academic ability of different (high, medium, and low). If possible, group members come from different cultural or ethnic as well as attention to gender equality.
3. Teachers assign tasks to groups related to the material that has been given, discuss together, help each other among members, as well as discuss the answers given task teacher. The ultimate goal is to ensure that each group can master the concepts and material. Task group materials prepared by teachers so that the basic competencies that are expected can be achieved.
4. Teacher gives a test / quiz to each student individually.
5. Teachers facilitate students in making a summary, directing, and giving emphasis on learning materials that have been studied.
6. Teachers give awards to groups based on the acquisition value of the increase in individual learning outcomes from the initial value to the value of the next quiz

7. RESULT AND DISCUSSION

A. Observation

Observations in class XI-IPA, Manyar SMAN 1 Gresik conducted on Wednesday, April 21, 2010. From observation, which lasted for two hours of lessons, the authors captured some of the information obtained either directly through observation, interviews, the average of student's mathematics achievement, and student data related to characteristics obtained through questionnaires. Here are some of the information obtained:

1. Numbers of students in class XI-IPA 3 are 33 people with the male students were 10 and female students were 23.
 2. Students who attend on Wednesday, April 21, 2010 amounted to 30 people.
 3. From the average value of student learning outcomes that the information obtained about 23.33% in the range of high value, 40% were in the middle range and the range of 36.67% in a low value. (Table1)
 4. For personality type, obtained 43.33% tend to Sanguine, 20% tend to Choleric, 16.67% tend to Melancholy, and 20% tend to Phlegmatic. (Table1)
 5. To tendencies hemisphere, 33.33% tend to be balanced, 20% tend to be strong right brain, 6.67% tend to be strong left brain, 20% tend to be middle of the right brain, and 20% tend to be middle of the left brain. (Table1)
-

6. For learning styles, about 46.67% have a visual learning style, 20% tend to audio learning styles, and 33.33% with a kinesthetic learning style. (Table2)
7. To tendencies thinking styles, 36.67% Abstract Random, 14.33% Concrete Random, 26.67% Abstract Sequential, and 22.33% Concrete Sequential. (Table2)

Table1. The Recapitulation of Students Personality, Preferences Hemispheres, and Average of Mathematics Achievement

Subject	Personality		Preference Hemisphere		Average of Math Achievement	Category of Average of Math Achievement
X1	103	Phlegmatic	58	Tend to be balanced	75.00	High
X2	96	Sanguine	69	Tend to be middle of the right brain	27.78	Low
X3	99	Sanguine	74	Tend to be strong right brain	25.00	Low
X4	91	Sanguine	68	Tend to be middle of the right brain	63.89	Middle
X5	87	Phlegmatic	52	Tend to be middle of the left brain	27.78	Low
X6	98	Sanguine	61	Tend to be balanced	55.56	Middle
X7	103	Sanguine	71	Tend to be strong right brain	30.56	Low
X8	97	Phlegmatic	55	Tend to be middle of the left brain	55.56	Middle
X9	85	Choleric	64	Tend to be middle of the right brain	86.11	High
X10	87	Choleric	43	Tend to be strong left brain	63.89	Middle
X11	110	Sanguine	60	Tend to be balanced	88.89	High
X12	87	Melancholic	52	Tend to be middle of the left brain	25.00	Low
X13	89	Choleric	51	Tend to be middle of the left brain	83.33	High
X14	87	Phlegmatic	75	Tend to be strong right brain	30.56	Low
X15	84	Phlegmatic	62	Tend to be balanced	55.56	Middle
X16	92	Sanguine	57	Tend to be balanced	77.78	High
X17	89	Sanguine	63	Tend to be balanced	63.89	Middle
X18	86	Choleric	59	Tend to be balanced	58.33	Middle
X19	86	Sanguine	49	Tend to be strong left brain	61.11	Middle
X20	96	Choleric	62	Tend to be balanced	91.67	High
X21	101	Melancholic	66	Tend to be middle of the right brain	25.00	Low
X22	92	Sanguine	62	Tend to be balanced	77.78	High
X23	101	Phlegmatic	78	Tend to be strong right brain	50.00	Middle
X24	89	Sanguine	77	Tend to be strong right brain	63.89	Middle
X25	89	Melancholic	51	Tend to be middle of the left	27.78	Low

				brain		
X26	91	Choleric	64	Tend to be middle of the right brain	30.56	Low
X27	89	Melancholic	67	Tend to be middle of the right brain	30.56	Low
X28	93	Sanguine	71	Tend to be strong right brain	63.89	Middle
X29	90	Sanguine	51	Tend to be middle of the left brain	16.67	Low
X30	92	Melancholic	59	Tend to be balanced	63.89	Middle

Table2. The Recapitulation of Students Learning and Thinking Style

Subject	Learning Style		Thinking Style		Subject	Learning Style		Thinking Style	
X1	18	Visual	44	Abstract Random	X16	16	Kinesthetic	40	Abstract Sequential
X2	19	Visual	40	Concrete Random	X17	19	Audio	36	Abstract Random
X3	20	Visual	40	Concrete Random	X18	22	Kinesthetic	44	Concrete Sequential
X4	17	Audio	40	Abstract Sequential	X19	17	Visual	52	Abstract Random
X5	15	Visual	32	Concrete Sequential	X20	23	Visual	44	Concrete Sequential
X6	17	Audio	52	Abstract Sequential	X21	17	Audio	48	Abstract Random
X7	20	Kinesthetic	52	Abstract Random	X22	23	Kinesthetic	32	Concrete Sequential
X8	19	Visual	40	Abstract Sequential	X23	21	Visual	36	Abstract Random
X9	22	Visual	36	Abstract Random	X24	25	Kinesthetic	56	Abstract Random
X10	21	Kinesthetic	36	Concrete Sequential	X25	16	Audio	40	Abstract Random
X11	17	Visual	40	Abstract Sequential	X26	16	Visual	44	Abstract Random
X12	16	Visual	44	Concrete Sequential	X27	20	Kinesthetic	40	Concrete Sequential
X13	18	Kinesthetic	36	Concrete Random	X28	23	Audio	36	Abstract Sequential
X14	17	Kinesthetic	36	Abstract Random	X29	18	Visual	40	Abstract Sequential
X15	17	Visual	36	Concrete Random	X30	18	Kinesthetic	36	Abstract Sequential

B. Plan

Based on preliminary data that already obtained, the authors tried to make a teaching plan in accordance with the objectives of the curriculum and subject matter competency to be achieved without prejudice to the innate characteristics of students both in terms of cognitive, affective, and psychomotor.

STAD cooperative learning model is optioned to be applied in class XI-IPA, SMAN 1 Manyar, Gresik to the subject matter Trigonometry Derivatives. There are some considerations of teacher aspects related to STAD learning steps that can be opportunities to optimize the different characteristics of students, such as:

1. Introduction

- Describe the benefits of derivatives in everyday life as motivation. It accommodates students with Sanguine personality who basically needs a boost of motivation from outside himself and Phlegmatic who tend to lack motivation at all. In contrast to the tendency of left-brain learners, they need to be taken to the examples of logical and rational, because they think in this way. Students with Sequential Concrete thinking style is not much different with the left brain thinkers, they are holding on to reality and reality, because that way they can remember easily.
- Recalling searching the derivative of a function used the definition rules of limit. It was very helpful to the students Sequential Random thinking styles who are always thinking in concepts. Way to remind them on the board will be very easy for the visual learner style. Pronouncing concepts or workflows that be voiced by teachers affect to hold understanding of students learning style audio.
- Delivering learning objectives and competencies required of students when studying the trigonometry derivative. The exposure is important information for students with Abstract Random thinking styles, because they need to know the complete picture of what will be learned. Along for students with the right brain tendencies, requires initial information to get a more thorough understanding.

2. Core Activities

- Explained to the students about how the concept of $\lim_{h \rightarrow 0} \frac{\sin h}{h} = 1$ formed by using slides and sketches required. The initial explanation is very supportive for students with left-brain tendencies that require order to raise understanding. The concept is also very helpful beginning students Sequential Random thinking styles to analyze that information, because they are more like to think in concepts.
- Distribute worksheets guided to the students. Guided LKS is helpful for students because they tend to be visual on the written instructions, although somewhat less favorable for audio students. Students with Melancholy personality types that tend to be theoretical helped too, because in the worksheets are good theories they have learned previously, as well as the theories that they will know after completing worksheets. Work on the student sheet made progressively to facilitate students thinking styles Concrete Sequential understand the concepts presented, because they will be optimal when learning the stages. In line with students with left-brain tendencies, they also need to understand the stages in a material.
- Reinforcing material concepts they have learned together from the beginning to the end of the lesson. That teachers activities can help students Concrete Sequential to make clear the information processes, optimizing of Abstract

Random students who require an overall description to build understanding, synergizing the students with the left and right brain tendencies because teachers do strengthening concepts in a way that is sequential (the tendency of the left brain) and overall (right brain tendencies). Strengthening the scheme may be beneficial for students visually. Regularity scheme can also help students Phlegmatic and Melancholy easier to absorb information learning through things systematically.

3. Closing Activities

- Giving students the opportunity to make a summary of the material that has been studied with the sentences themselves and do reflection. Through these activities the teacher accommodates Abstract Random students and students with Melancholy personality to develop their reflection skills.
- Awarded in each group. This activity is in addition to the students' motivation to always keep the spirit of the next teaching-learning, as well as an appreciation for the work done each group

8. COCNLUSION AND SUGGESTION

A. Conclusion

In general, the implementation of learning with the Trigonometry Derivatives subject matter in class XI -IPA, Manyar SMAN 1 Gresik, runs according to what was planned in the RPP. Simple analyzes were performed before learning performed as analysis of the characteristics of students, learning task analysis and context analysis, a little more initial information for teachers to design learning scenarios as well as student learning tasks wherever possible include the needs of individual student characteristics. However, such analyzes do not become easy for teachers. Need accuracy and focus in-depth lesson plan to suit each student's capacity in terms of intelligence, learning style, the use of parts of the brain, and personality differences. This is a challenge for teachers to train professionalism duties not only as a facilitator in the classroom but also the organizer before and after the learning takes place.

B. Advice

A few things to note author who acts as a teacher in the classroom XI-IPA on the activities of planning, implementation, and evaluation of lesson plans that have been made, such as:

1. The teacher attempt for more better understand the characteristics of students who became his care, both the strengths and weaknesses of each students, covering aspects of intelligence, psychological aspects, and aspects of student characteristics such as the personality tendencies, preference hemisphere, learning and thinking style.
2. Teachers should know what parts of the student's self-esteem that can be optimized, improved, or developed. While the weaknesses in each students can be minimized.
3. Teachers should more realize that every student has the same privileges but teaching these students have a unique character and different from each other, so it

could be a method of learning for students with character A is not equal to B. This is where the character of students challenged teachers to be able to play its role optimally and emerged as ' teachers' resourceful ', because deal with students in different conditions of characters, different level of understanding and different way to absorb and process information.

4. Teacher should frequently recall about his role in the learning that is concerned with how to design or arranges various sources and facilities available for use or used students to learn something.

9. BIBLIOGRAPHY

- Ball. 2001. *Lateralization of Function in Cerebral Hemispheres*. [Online]. Rretrived from: <http://www.jhu.edu/hurj/research-bardhan.html> [Downloaded February 17th, 2006].
- Ibrahim, Muslimin dkk. 2000. *Pembelajaran Kooperatif*. Surabaya: Surabaya University Press.
- Ibrahim, Muslimin. 2000. *Pengajaran Berdasarkan Masalah*. Surabaya: Surabaya University Press.
- Ismail. 2003. *Media Pembelajaran (Model-model Pembelajaran)*. Jakarta: Proyek Peningkatan Mutu SLTP.
- Kardi, S. 2000. *Pengajaran Langsung*. Surabaya: Surabaya University Press.
- Kemp, dkk. 1994. *Designing Effective Instruction*. New York: Mac Millan College Publishing Company.
- Nur, Muhammad. 2003. *Buku Panduan Keterampilan Proses dan Hakekat Sains*. Surabaya: Surabaya University Press.
- Porter. 2001. *Quantum Learning*. Bandung: Kaifa Mizan.
- Samani, Muchlas. 2010. *Merekonstruksi Sistem Pendidikan Holistik Berbasis Keindonesiaan*. Majalah Pendidikan, CERDAS. Surabaya: PT JePe Press Media Utama, 05 Maret-April 2010 Edition.
- Wina, S. 2006. *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Jakarta: Kencana Prenada Media.